

Quadratic Equation

$$ax^2+bx+c=0$$

a = coefficient of x^2

b = coefficient of x

c = constant term

There are 5 Questions asked from this topic. Two equations given and we have to find the values and the relationship between these equations. Relationship can be:

- (A) $x > y$
- (B) $x < y$
- (C) $x \geq y$
- (D) $x \leq y$
- (E) $x = y$ or no relation

Example 1:

$$x^2-5x+6=0$$

$$y^2-8y+16=0$$

Step1: let us take equation 1. $x^2-5x+6=0$

In this equation, **coefficient of x, 5 should be split into two numbers** in such a way that **multiplication of both numbers should be equal to constant term 6 and addition of numbers should be equal to 5.**

It can be split into (1+4 and 2+3)

In the combination of 2 and 3 can achieve the product 6. **Coefficient of x^2 is 1 and negative sign with 5x, we have to change the sign for both factors from negative to positive.**

$$x = +2 \text{ and } +3$$

Step 2: Now equation 2. $y^2-8y+16=0$

Similar process applicable for this equation to find y, here coefficient of y should be split into two numbers and multiplication of the numbers should give 16.

8 can be split up into (1,7) (2,6) (3,5) (4,4)

Combination of 4 and 4 alone satisfy the condition i.e. giving 8 while adding and giving 16 while multiplying the numbers, since there is no negative sign in the equation, we can directly write value of y by changing sign.

$$y = +4, +4$$

Now, compare the value of x with the values of y.

$$\text{First, } x_1 = +2 < y_1 = +4$$

$$\text{Second, } x_1 = +2 < y_2 = +4$$

$$\text{Third, } x_2 = +3 < y_1 = +4$$

$$\text{Fourth, } x_2 = +3 < y_2 = +4$$

Hence, we can say that $x < y$.

Example 2:

$$\text{I. } x^2-x-6=0$$

$$\text{II. } 2y^2+13y+21=0$$

$$\text{Sol: I. } x^2-x-6=0$$

Factors are (+2 and -3)

No coefficient with x^2 , just reverse the sign.

$$\text{Now, } x_1 = -2$$

$$x_2 = +3$$

$$\text{II. } 2y^2+13y+21=0$$

Same process as above,

Factors are (+6 and +7)

Divided by Coefficient of x^2 which is 2

Now, Change the signs and divide the both numbers by 2.

$$y_1 = -6/2 = -3$$

$$y_2 = -7/2 = -3.5$$

Compare values of x and y

$$x_1 > y_1$$

$$x_2 > y_2$$

$$x_1 > y_1$$

$$x_2 > y_2$$

No opposite sign there. Hence, $x > y$

Example 3:

$$\text{I. } x^2-5x+4=0$$

$$\text{II. } y^2+11y+30=0$$

Sol:

$$\text{I. } x^2-5x+4=0$$

$$\text{Values of } x = +4, +1$$

$$\text{II. } y^2+11y+30=0$$

$$\text{Values of } y = -5, -6$$

We can clearly say that $x > y$.

Practice Questions

1. I. $2x^2+21x+34 = 0$

II. $3y^2+23y+42 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

2. I. $x^2-15x-364 = 0$

II. $y^2+31y+240 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

3. I. $x^2 - 3481 = 0$

II. $y^2 - 118y + 3481 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

4. I. $2x^2+11x+15 = 0$

II. $4y^2+16y+15 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

5. I. $x^3 - 9x^2 + 20x = 0$

II. $y^3 - 14y^2 + 48y = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

6. $2x^2+x-21 = 0$

$3y^2+4y+32 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

7. $x^2-6x+135 = 0$

$y^2-30y+225 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \leq y$ (D) $x \geq y$
(E) $x = y$ or no relation

8. $\frac{25}{\sqrt{x}} - 4\sqrt{x} = \sqrt{x}$

$2y + \frac{y^2+50}{y} = 5y$

- (A) $x > y$ (B) $x < y$
(C) $x \leq y$ (D) $x \geq y$
(E) $x = y$ or no relation

9. $x^2-43x+462 = 0$

$y^2-37y+342 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

10. $\sqrt{x} + \frac{28}{\sqrt{x}} = 5\sqrt{x}$

$\sqrt{y} + \frac{y+35}{\sqrt{y}} = 7\sqrt{y}$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

11. $4x^2-25x+25 = 0$

$2y^2-13y+21 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

12. $2x^2-6x-48 = 0$

$y^2-13y+42 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \leq y$ (D) $x \geq y$
(E) $x = y$ or no relation

13. I. $6x^2-19x-36 = 0$

II. $4y^2-47y+120 = 0$

- (A) $x > y$ (B) $x < y$
(C) $x \leq y$ (D) $x \geq y$
(E) $x = y$ or no relation

14. $4x^4 = \frac{128}{x}$

$\sqrt{y} + \frac{15y}{\sqrt{y}} = 4y^{\frac{5}{2}}$

- (A) $x > y$ (B) $x < y$
(C) $x \geq y$ (D) $x \leq y$
(E) $x = y$ or no relation

Solutions**1. Answer is option E****Explanation:**

I. $2x^2 + 21x + 34 = 0$

$2x^2 + 17x + 4x + 34 = 0$

$x = -\frac{17}{2} = -8.5, -\frac{4}{2} = -2$

II. $3y^2 + 23y + 42 = 0$

$3y^2 + 14y + 9y + 42 = 0$

$y = -\frac{14}{3} = -4.66, -\frac{9}{3} = -3$

Hence, no relation.

2. Answer is option A**Explanation:**

I. $x^2 - 15x - 364 = 0$

$x^2 - 28x + 13x - 364 = 0$

$x = +28, -13$

II. $y^2 + 31y + 240 = 0$

$y^2 + 15y + 16y + 240 = 0$

$y = -15, -16$

Hence, $x > y$ **3. Answer is option D****Explanation:**

I. $x^2 - 3481 = 0$

$x^2 = 3481$

$x = \pm 59$

II. $y^2 - 118y + 3481 = 0$

$y^2 - 59y - 59y + 3481 = 0$

$y = +59, +59$

Hence, $x \leq y$ **4. Answer is option D****Explanation:**

I. $2x^2 + 11x + 15 = 0$

$2x^2 + 6x + 5x + 15 = 0$

$x = -\frac{6}{2} = -3, -\frac{5}{2} = -2.5$

II. $4y^2 + 16y + 15 = 0$

$4y^2 + 10y + 6y + 15 = 0$

$y = -\frac{10}{4} = -2.5, -\frac{6}{4} = -1.5$

Hence, $x \leq y$ **5. Answer is option E****Explanation:**

I. $x^3 - 9x^2 + 20x = 0$

$x(x^2 - 9x + 20) = 0$

$x^2 - 9x + 20 = 0$

$x^2 - 4x - 5x + 20 = 0$

$x = 4, 5 \text{ and } 0$

II. $y^3 - 14y^2 + 48y = 0$

$y(y^2 - 14y + 48) = 0$

$y^2 - 14y + 48 = 0$

$y^2 - 6y - 8y + 48 = 0$

$y = 6, 8 \text{ and } 0$

Hence, no relation

6. Answer is option E**Explanation:**

$2x^2 + x - 21 = 0$

$2x^2 + 7x - 6x - 21 = 0$

$x = \frac{7}{2} = +3.5, -\frac{6}{2} = -3$

$3y^2 + 4y + 32 = 0$

$3y^2 + 12y - 8y + 32 = 0$

$y = -\frac{12}{3} = -4, +\frac{8}{3} = +2.66$

Hence, no relation.

7. Answer is option C**Explanation:**

$x^2 - 6x + 135 = 0$

$x^2 - 15x + 9x + 135 = 0$

$x = +15, -9$

$y^2 - 30y + 225 = 0$

$y^2 - 15y - 15y + 225 = 0$

$y = +15, +15$

Hence, $x \leq y$ **8. Answer is option D****Explanation:**

$\frac{25}{\sqrt{x}} - 4\sqrt{x} = \sqrt{x}$

$25 - 4x = x$

$25 = 5x$

$x = 5$

$$2y + \frac{y^2+50}{y} = 5y$$

$$2y^2 + y^2 + 50 = 5y^2$$

$$2y^2 = 50$$

$$y = \sqrt{25}$$

$$y = \pm 5$$

Hence, $x \geq y$

9. Answer is option A

Explanation:

$$x^2 - 43x + 462 = 0$$

$$x^2 - 22x - 21x + 462 = 0$$

$$x = +22, +21$$

$$y^2 - 37y + 342 = 0$$

$$y^2 - 19y - 18y + 342 = 0$$

$$y = +19, +18$$

Hence, $x > y$

10. Answer is option E

Explanation:

$$\sqrt{x} + \frac{28}{\sqrt{x}} = 5\sqrt{x}$$

$$\sqrt{x} + \frac{28}{\sqrt{x}} = 5\sqrt{x}$$

$$x + 28 = 5x$$

$$28 = 4x$$

$$x = 7$$

$$\sqrt{y} + \frac{y+35}{\sqrt{y}} = 7\sqrt{y}$$

$$y + y + 35 = 7y$$

$$35 = 5y$$

$$y = 7$$

$$x = y$$

11. Answer is option E

Explanation:

$$4x^2 - 25x + 25 = 0$$

$$4x^2 - 20x - 5x + 25 = 0$$

$$x = \frac{20}{4} = 5, x = \frac{5}{4} = 1.25$$

$$2y^2 - 13y + 21 = 0$$

$$2y^2 - 7y - 6y + 21 = 0$$

$$y = \frac{7}{2} = 3.5, y = \frac{6}{2} = 3$$

Hence, there is no relation.

12. Answer is option C

Explanation:

$$2x^2 - 4x - 48 = 0$$

$$2(x^2 - 2x - 24) = 0$$

$$x^2 - 2x - 24 = 0$$

$$x^2 - 6x + 4x - 24 = 0$$

$$x = +6, -4$$

$$y^2 - 13y + 42 = 0$$

$$y^2 - 7y - 6y + 42 = 0$$

$$y = +7, +6$$

Hence, $x \leq y$.

13. Answer is option E

Explanation:

$$I. 6x^2 - 19x - 36 = 0$$

$$6x^2 - 27x + 8x - 36 = 0$$

$$x = +\frac{27}{6} = +4.5$$

$$x = -\frac{8}{6} = -1.33$$

$$II. 4y^2 - 47y + 120 = 0$$

$$4y^2 - 32y - 15y + 120 = 0$$

$$y = +\frac{32}{4} = +8$$

$$y = +\frac{15}{4} = +3.75$$

No relation

14. Answer is option C

Explanation:

$$\sqrt{y} + \frac{15y}{\sqrt{y}} = 4y^{\frac{5}{2}}$$

$$y + 15y = 4y^3$$

$$y(1+15) = 4y^3$$

$$16 = 4y^2$$

$$4 = y^2$$

$$y = \pm 2$$

$$4x^4 = \frac{128}{x}$$

$$4x^5 = 128$$

$$x^5 = 32$$

$$x^5 = 2^5$$

$$x = 2$$

Hence, $x \geq y$